

## VOLUME CONTENTS

### Volume 6, Number 1

January 1993

- |   |     |  |
|---|-----|--|
| <b>C. Swaminathan, P. Pyke</b><br>and <b>R. F. Johnston</b>   | 1   | Reagent trends in the gold extraction industry   |
| <b>T. M. Sun</b> and <b>W. T. Yen</b>   | 17  | Kinetics of gold chloride adsorption onto activated carbon   |
| <b>D. W. Ginsberg</b> and<br><b>W. J. Whiten</b>  | 31  | Expert system development using ellipsoid-based clustering   |
| <b>E. J. Roldan-Villasana,</b><br><b>T. Dyakowski, M. S. Lee,</b><br><b>F. J. Dickin</b> and<br><b>R. A. Williams</b> | 41  | Design and modelling of hydrocyclones and hydrocyclone networks for fine particle processing                                 |
| <b>Z. A. Zhou, N. O. Egiebor</b><br>and <b>L. R. Plitt</b>  | 55  | Frother effects on bubble size estimation in a flotation column  |
| <b>O. Pavez</b> and <b>A. E. C. Peres</b>   | 69  | Effect of sodium metasilicate and sodium sulphide on the floatability of monazite-zircon-rutile with oleate and hydroxamates |
| <b>A. Yehia, J. D. Miller</b> and<br><b>B. G. Ateya</b>   | 79  | Analysis of the adsorption behaviour of oleate on some synthetic apatites  |
| <b>R. W. Allen</b> and<br><b>T. D. Wheelock</b>   | 87  | Effects of pH and ionic strength on kinetics of oil agglomeration of fine coal   |
| <b>G. J. Lyman</b>  | 99  | <i>Technical Note</i><br>Determination of bias in sampling systems   |
| <b>J. Ralston</b>   | 107 | <i>Book Reviews</i><br>Flotation: Theory, Reagents and Ore Testing, by <i>R. D. Crozier</i>                                  |
| <b>W. A. Neil</b>   | 108 | Slurry Handling—Design of Solid-Liquid Systems, edited by <i>N. P. Brown</i> and <i>N. I. Heywood</i>                        |
|   | 108 | Randol Gold Forum, Vancouver '92   |
|   | 109 | Calendar of International Conferences, Symposia, Courses and Meetings of Interest  |
|   | 115 | Recent Mineral Processing Publications   |
|   | I   | Information for Contributors   |

### Volume 6, Number 2

February 1993

- |  |     |   |
|--|-----|---|
| <b>J. A. Meech</b> and <b>L. A. Jordon</b> | 119 | Development of a self-tuning fuzzy logic controller |
|--|-----|---|

<b>S. J. Peng and R. A. Williams</b>	133	Control and optimisation of mineral flocculation and transport processes using on-line particle size analysis
<b>G. M. Leigh, D. N. Sutherland and P. Gottlieb</b>	155	Confidence limits for liberation measurements
<b>Li Gongbo and Xu Xiaohu</b>	163	Experimental investigation of the energy-size reduction relationship in comminution using fractal theory
<b>R. Mensah-Biney, M. T. Hepworth and K. J. Reid</b>	173	Loading of gold bromo species onto anion exchange resin

#### *Technical Notes*

<b>D. Walsh and E. G. Kelly</b>	193	Nominal diameters of gold particles
<b>Z. A. Zhou and N. O. Egiebor</b>	199	A gas-liquid drift-flux model for flotation columns

#### 207 Correspondence

#### *Book Reviews*

211	Innovations in Flotation Technology, <i>edited by P. Mavros and K. A. Matis</i>
211	Preparation in the 1990's, <i>edited by P. J. Lean</i>
212	Environmental Issues and Management of Waste in Energy and Mineral Production, <i>edited by R. J. Singhal, A. K. Mehrotra, K. Fytas and J.-L. Collins</i>
213	Calendar of International Conferences, Symposia, Courses and Meetings of Interest
223	Recent Mineral Processing Publications
231	New Patents

#### I Information for Contributors

### **Volume 6, Number 3**

**March 1993**

<b>F. Flament, J. Thibault and D. Hodouin</b>	235	Neural network based control of mineral grinding plants
<b>L. C. Woollacott and G. Nino de Guzman</b>	251	The combined influence of oxygen and cyanide on adsorption isotherms in carbon-based gold extraction systems
<b>F. F. Lins and R. Adamian</b>	267	The influence of some physical variables on gold flotation

<b>M. Takemori</b>	279	Hydrometallurgical methods for extraction and purification of silica
<b>Z. A. Zhou, L. R. Plitt and N. O. Egiebor</b>	291	The effects of solids and reagents on the characteristics of coal flotation in columns
		<i>Technical Notes</i>
<b>Z. A. Zhou and N. O. Egiebor</b>	307	Prediction of axial gas holdup profiles in flotation columns
<b>C. Hiçyılmaz, Ü. Atalay and G. Özbayoglu</b>	313	Selective flotation of scheelite using amines
	321	Correspondence
	325	Calendar of International Conferences, Symposia, Courses and Meetings of Interest
		<i>Conference Reports</i>
<b>S. T. Hall</b>	327	1st International Conference on Modern Process Mineralogy and Mineral Processing
<b>B. A. Wills</b>	328	IV International Mineral Processing Symposium
		<i>Conference Proceedings</i>
	329	Hydrocyclones
	333	Recent Mineral Processing Publications
	339	New Patents
	I	Information for Contributors
<b>Volume 6, Number 4</b>		<b>April 1993</b>
<b>Ta-Wui Cheng, P. N. Holtham and Tam Tran</b>	341	Froth flotation of monazite and xenotime
<b>R. P. King and F. Bourgeois</b>	353	Measurement of fracture energy during single-particle fracture
<b>S. Banisi, J. A. Finch and A. R. Laplante</b>	369	Electrical conductivity of dispersions: a review
<b>A. D. Bailey and G. S. Hansford</b>	387	A fluidised bed reactor as a tool for the investigation of oxygen availability on the bio-oxidation rate of sulphide minerals at high solids concentrations
<b>W. Whiten, P. Steffens and J. Hitchins</b>	397	An examination of pulp viscosity in tubes at higher shear rates
		<i>Technical Note</i>
<b>B. R. Rao, L. S. Rao, A. K. Mazumdar and T. C. Rao</b>	405	Fluoride aided potassium extraction from glauconitic sandstone for liquid fertilizer

415	Errata
417	Correspondence
	<i>Book Review</i>
421	Fine Coal Beneficiation, by <i>S. K. Nicol</i>
423	Calendar of International Conferences, Symposia, Courses and Meetings of Interest
	<i>Announcements</i>
427	Symposium on processing of complex and refractory ores
429	Minerals Engineering '93
431	Recent Mineral Processing Publications
437	New Patents
I	Information for Contributors

## Volume 6, Number 5

May 1993

<b>T. V. Subrahmanyam and K. S. E. Forssberg</b>	439	Mineral solution-interface chemistry in minerals engineering
<b>E. Kusaka, H. Tamai, Y. Nakahiro and T. Wakamatsu</b>	455	Role of surface free energy in a solid surface during collectorless liquid-liquid extraction
<b>P. Mavros</b>	465	Mixing in flotation columns. Part I: axial dispersion modelling
<b>W. Stange</b>	479	Using artificial neural networks for the control of grinding circuits
<b>L. G. Austin, D. N. Sutherland and P. Gottlieb</b>	491	An analysis of SAG mill grinding and liberation tests
<b>A. R. Laplante, U. Prasad, R. E. McIvor and J. A. Finch</b>	509	Error analysis for bond work index determinations part 2: a phenomenological basis for the analysis of systematic errors for the rod mill test
<b>A. J. G. Beck and P. N. Holtham</b>	523	Computer simulation of particle stratification in a two-dimensional batch jig
<b>Y. Wang, E. Forssberg and R. J. Pugh</b>	537	Hydrophobic magnetite seeding of hematite ultrafines in high gradient magnetic separation
	547	Correspondence
		<i>Book Review</i>
<b>W. G. Davenport</b>	549	Extractive Metallurgy of Vanadium, by <i>C. K. Gupta and N. Krishnamurthy</i>
	551	Calendar of International Conferences, Symposia, Courses and Meetings of Interest

**P. R. Khangaonkar**

*Conference Report*

- 554 International Conference on Extractive Metallurgy of Gold and Base Metals

*Announcements*

- 555 Symposium on processing of complex and refractory ores
- 556 Minerals Engineering '93
- 557 Recent Mineral Processing Publications
- 561 New Patents
- I Information for Contributors

**Volume 6, Number 6**

**June 1993**

**SPECIAL ISSUE**

**Selected papers from the XV Brazilian Meeting on  
Mineral Processing and Hydrometallurgy  
Sao Lourenço, Brazil, 13-16 September 1992**

- V. S. T. Ciminelli and  
M. J. G. Salum** 563 Foreword
- R. B. E. Trindade and  
A. J. Monhemius** 565 The use of anthraquinone as a catalyst in the cyanide leaching of gold
- C. M. Juarez and  
J. F. Oliveira** 575 Activated carbon adsorption of gold from thiourea solutions
- A. C. Q. Ladeira,  
M. E. M. Figueira and  
V. S. T. Ciminelli** 585 Characterization of activated carbons utilized in the gold industry: physical and chemical properties, and kinetic study
- J. S. Benedetto,  
V. S. T. Ciminelli and  
J. D. Neto** 597 Comparison of extractants in the separation of samarium and gadolinium
- C. Yerkovic, J. Menacho  
and L. Gaete** 607 Exploring the ultrasonic comminution of copper ores
- R.-H. Yoon** 619 Microbubble flotation
- L. G. Bergh and  
J. B. Yianatos** 631 Control alternatives for flotation columns
- A. J. Rodrigues and  
P. R. G. Brandao** 643 The influence of crystal chemistry properties on the floatability of apatites with sodium oleate
- E. Valdiviezo and  
J. F. Oliveira** 655 Synergism in aqueous solutions of surfactant mixtures and its effect on the hydrophobicity of mineral surfaces

<b>A. J. B. Dutra, J. C. Vazquez and A. Espínola</b>	663	Use of pulse currents for tantalum electrowinning in molten fluorides
	673	Calendar of International Conferences, Symposia, Courses and Meetings of Interest
		<i>Conference Reports</i>
<b>R. A. Williams</b>	677	Control of particulate processes III
	678	SME Annual Meeting
	681	Minerals Engineering '93
		<i>Conference Proceedings</i>
<b>D. Barr</b>	691	Mineral Bioprocessing
	693	Recent Mineral Processing Publications
	I	Information for Contributors

#### Volume 6, Number 7

July 1993

<b>B. A. Wills and K. Atkinson</b>	697	Some observations on the fracture and liberation of mineral assemblies
<b>P. Mavros and A. Daniilidou</b>	707	Mixing in flotation columns. Part II. Liquid-phase residence time distributions studies
<b>Rouwen Fu, Hanmin Zeng and Yun Lu</b>	721	The reducing property of activated carbon fibre and its application in the recovery of gold
<b>B. Hu, Y. Nakahiro and T. Wakamatsu</b>	731	The effect of organic solvents on the recovery of fine mineral particles by liquid-liquid extraction
<b>M. S. Lee and R. A. Williams</b>	743	Performance characteristics within a modified hydro-cyclone
<b>R. W. Smith and Y. Narimatsu</b>	753	Electrokinetic behavior of kaolinite in surfactant solutions as measured by both the microelectrophoresis and streaming potential methods
<b>P. R. Khangonkar and K. J. Bala Subramani</b>	765	Flocculation of hematite fines by anionic polyacrylamide polymers
<b>Ç. Hoşten</b>	775	Cake filtration rate equations: a review of classical and modern approaches
<b>R. L. Nyirenda and A. D. Lugtmeijer</b>	785	Ammonium carbonate leaching of carbon steelmaking dust. Detoxification potential and economic feasibility of a conceptual process
	799	Calendar of International Conferences, Symposia, Courses and Meetings of Interest

*Book Reviews*

- R. A. Williams** 803 Particle Classification, by *K. Heiskanen*  
**R. W. Barley** 804 Principles of Flow in Disperse Systems, by *O. Molerus*  
I Information for Contributors

Volume 6, Numbers 8-10

August-October 1993

SPECIAL ISSUE

SYMPOSIUM ON PROCESSING OF COMPLEX AND REFRACTORY ORES

**Proceedings of the International Symposium held at the  
Camborne School of Mines, Cornwall, UK, 6-8 April 1993**

- B. A. Wills** 807 Preface  
**R. A. Williams** 809 Processing problematic ores  
**J. W. G. Turner and M. P. Hallewell** 817 Process improvements for fine cassiterite recovery at Wheal Jane  
**D. Clemente, P. Newling, A. Botelho de Sousa, G. LeJeune, S. P. Barber and P. Tucker** 831 Reprocessing slimes tailings from a tungsten mine  
**G. Morizot and P. Ollivier** 841 A process for the economic beneficiation of As- and As-Au-bearing antimony ores. Has the dream become a reality?  
**P. M. Prasad, T. R. Mankhand and P. Suryaprakash Rao** 857 Lime-scavenged reduction of molybdenite  
**H. G. Linge and W. G. Jones** 873 Electrolytic oxidation of arsenopyrite slurries  
**L. K. Witika and B. Dobias** 883 Electrokinetics of sulphide minerals: fundamental surface reactions of carrollite  
**R. B. Bjorklund and H. Arwin** 895 Distribution of an adsorbed anionic surfactant on the external and internal surfaces of a porous apatite mineral  
**L. S. Leal Filho, S. M. Assis, A. C. Araujo and A. P. Chaves** 907 Process mineralogy studies for optimizing the flotation performance of two refractory phosphate ores  
**J. Kallioinen and K. Heiskanen** 917 Effective flotation of a difficult nickel-ore based on intelligent mineral technology



- S. Ayyala, T. V. Subrahmanyam, R. J. Pugh and K. S. E. Forssberg** 929 Effect of corrosion inhibitors on grinding and flotation of a lead-zinc ore
- M. E. Chalkley, E. Ozberk and W. D. Vardill** 937 The treatment of bulk concentrates by the Sherritt zinc pressure leach process
- T. J. Harvey, W. Tai Yen and J. G. Paterson** 949 A kinetic investigation into the pressure oxidation of sphalerite from a complex concentrate
- J. Barrett and M. N. Hughes** 969 The mechanism of the bacterial oxidation of arsenopyrite-pyrite mixtures: the identification of plant control parameters
- P. Rusin, L. Quintana and J. Cassells** 977 Enhancement of copper and molybdenum bioextraction from sulfide ore through nutrient balance and the addition of *Thiobacillus cuprinus*
- G. Van Weert and P. J. Kroes** 991 Development of the Delft inclined plate (DIP) bioreactor
- M. A. Jordan, D. W. Barr and C. V. Phillips** 1001 Iron and sulphur speciation and cell surface hydrophobicity during bacterial oxidation of a complex copper concentrate
- L. Lorenzen and J. S. J. van Deventer** 1013 The identification of refractoriness in gold ores by the selective destruction of minerals
- G. E. Bodnaras, K. Jones and W. P. Staunton** 1025 Gold leaching—improved technology for oxygen injection
- V. J. Ketcham, J. F. O'Reilly and W. D. Vardill** 1037 The Lihir gold project; process plant design
- M. T. van Meersbergen, L. Lorenzen and J. S. J. van Deventer** 1067 The electrochemical dissolution of gold in bromine medium
- 1081 Symposium on Processing of Complex and Refractory Ores—Registered Delegates
- 1085 Minerals Engineering '93
- R. A. Williams** 1087 *Book Review*  
Metal Extraction by Bacterial Oxidation of Minerals, by J. Barrett, M. N. Hughes, G. I. Karavaiko and P. A. Spencer
- S. T. Hall** 1089 *Conference Proceedings*  
Artificial Intelligence in Materials Processing
- S. T. Hall** 1090 Waste Processing and Recycling in Mining and Metallurgical Industries



- 1093 Calendar of International Conferences, Symposia, Courses and Meetings of Interest

*Conference Report*

**B. A. Wills**

- 1096 XVIIth International Mineral Processing Congress

- 1097 Recent Mineral Processing Publications

- 1109 New Patents

I Information for Contributors

**Volume 6, Number 11**

**November 1993**

**J. F. Coates**

- 1111 Shaking the foundations: mineral industries in the 21st century

**M. J. Neiva Correia,  
J. R. Carvalho  
and A. J. Monhemius**

- 1117 Study of the autoclave leaching of a tetrahedrite concentrate

**T. J. Van der Walt,  
J. S. J. van Deventer  
and E. Barnard**

- 1127 Neural nets for the simulation of mineral processing operations: part I. Theoretical principles

**T. J. Van der Walt,  
J. S. J. van Deventer  
and E. Barnard**

- 1135 Neural nets for the simulation of mineral processing operations: part II. Applications

**G. K. N. S. Subasinghe**

- 1155 Optimal design of sluice-boxes for fine gold recovery

**P. Mavros**

- 1167 Mixing in flotation columns. Part III. Internal circulation

*Technical Notes*

**L. Liu, S. R. Rao  
and J. A. Finch**

- 1183 Laboratory study of effect of recycle water on flotation of a Cu/Zn sulphide ore

**I.-K. Choi, W.-W. Wen  
and R. W. Smith**

- 1191 The effect of a long chain phosphate on the adsorption of collectors on kaolinite

- 1199 Calendar of International Conferences, Symposia, Courses and Meetings of Interest

I Information for Contributors

**Volume 6, Number 12**

**December 1993**

**J. Segovia and G. Schena**

- 1203 Assessing profitability of mineral processing

**J. S. J. van Deventer,  
V. E. Ross and R. C. Dunne**

- 1217 The effect of galvanic interaction on the behaviour of the froth phase during the flotation of a complex sulphide ore

**M. S. El-Salmawy,  
Y. Nakahiro and  
T. Wakamatsu**

1231 The role of alkaline earth cations in flotation separation of quartz from feldspar

**J. L. Scott and  
R. W. Smith**

1245 Calcium ion effects in amine flotation of quartz and magnetite

**K. A. Kydros,  
T. N. Angelidis and  
K. A. Matis**

1257 Selective flotation of an auriferous bulk pyrite-arsenopyrite concentrate in presence of sodium sulphony-salts

**P. Mavros, K. A. Kydros  
and K. A. Matis**

1265 Arsenopyrite enrichment by column flotation

**M. T. Ityokumbul**

*Technical Note*

1279 Maximum gas velocity in column flotation

1287 Calendar of International Conferences, Symposia, Courses and Meetings of Interest

1291 Recent Mineral Processing Publications

1293 Minerals Engineering '94

I Title Section, Volume Contents and Author Index

XV Information for Contributors

